Volume:02 Jan-Dec 2017

ELECTRO-MOTTO

Magazine of

ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

R.V.R. & J.C.COLLEGE OF ENGINEERING
(AUTONOMOUS)
Chandramoulipuram, Chowdavaram, GUNTUR – 522 019.

From the Principal

It is always a pleasure to be a part of a team which strives to bring out the talents of students and staff. Electrical and Electronics department of RVR&JC College of Engineering has always been striving to keep itself ahead of the competition. The essential purpose of a magazine is to inform, engage, inspire and entertain a diverse readership including alumni, parents, students, faculty, staff and other friends of the college by telling powerful stories that present a compelling, timely and honest portrait of the college and its extended family. This magazine has made an earnest attempt in this direction and brought out certain aspects to the eyes of the public so that they may understand and know the EEE department even better.

Dr.K.Srinivasu

From the HOD of EEE

I am happy to note that the magazine brought out in our EEE department is of good quality and taste. Hearty congratulations to the editorial team. It is a matter of great pleasure for me to go through the wonderful contributions made by the students. This magazine is intended to bring out the hidden literary talents in the students and to inculcate leadership skills among them. The outside world will come to know about the caliber of our students through this magazine. I extend my thanks to all the contributors for their articles, poems and drawings.

Dr.K.Chandrasekhar

ABOUT THE DEPARTMENT:

The Department of Electrical and Electronics Engineering has been established during the academic year 1994 - 1995 with an intake of 60 students. The intake has been enhanced to 120 from the academic year 2004 -2005 and 180 from the academic year 2013-2014. Department was accredited twice by National Board of Accreditation of AICTE first in the year 2002 with A-Grade for five years, in the year 2007 for three years and in 2012 for two years. We have over 10 laboratories with advanced equipment and facilities for supporting our teaching and research. It is envisioned to strengthen the quality of its faculty, research and teaching facilities, as well as student's academic performance.

Our vision:

The vision of the department of Electrical & Electronics Engineering is "To impart education leading to highly competent professionals in the field of Engineering who are globally competent and to make the Department a Centre for Excellence".

Our Mission:

The mission of the department of Electrical & Electronics Engineering is "The Integrated development of professionals with knowledge and skills in the fields of specialization, ethics and values needed to be employable in the fields of Electrical Engineering and contribute to the economic growth of the employing organization and pursue lifelong learning**".**

Achievements:

The Department of Electrical & Electronics Engineering standing among all the other branches of our college.

- Accredited "A" grade for three years by NBA, AICTE New Delhi in the year 2017 for three years.
- Accredited "A" grade for two years by NBA, AICTE New Delhi in the year 2012 for two years.

- Accredited "A" grade for three years by NBA, AICTE New Delhi in the year 2007 for three years.
- Accredited "A" grade for five years by NBA, AICTE New Delhi in the year 2002 for five years.
- College Accredited by APSCHE, Hyderabad in academic Audit Grade. It is informed that it is the Second best among the private Engineering Colleges in Andhra Pradesh.
- P.G. Course M.Tech. In Power Systems Engineering was started in 2004 with an intake of 18 students.
- The Students of the department excels in the University Examinations by being University I Rank Every Year.
- The Department is the winner of CZARS Title (Overall Championship) thrice in the years 2008, 2014, 2016 within the college.

Program Educational Objectives:

I. To facilitate the students to become Electrical & Electronics Engineers who able to competent, innovative and productive in addressing the broader interests of the organizations & society.

II. To prepare the students to grow professionally with proficient soft skills.

III. To make our graduates to engage and excel in activities to enhance knowledge in their professional works with ethical codes of life & profession.

Program Outcomes:

Engineering Graduates will be able to:

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reportsand design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12**. Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs) of EEE Department:

PSO 1: Graduates of the program must demonstrate knowledge and hands on competence in developing, Testing, Operation and Maintenance of Electrical & Electronics systems.

PSO 2: Graduates of the program must demonstrate knowledge and hands on competence in Modern Engineering tools to engage in life-long learning and to successfully adapt in multi disciplinary environments.

PSO 3: Graduates of the program must demonstrate knowledge in Project Management techniques, environmental issues and Green technologies.

List of Students eligible for academic prizes on Annual day celebrations in 2017

III/IV B.Tech EEE				
Regd No.	**Name**	**Marks**	**CGPA**	**Rank**
Y13EE879	Kommuru.Himabindu	4855	9.93	First
Y13EE842	Dupuguntla.DurgaSusmitha	4778	9.91	Second
Y13EE941	Seshank.Vanama	4745	9.87	Third
II/IV B.Tech EEE				
Regd No.	**Name**	**Marks(3400)**	**CGPA**	**Rank**
Y14EE841	GuntupalliAmani	3202	9.93	First
Y14EE931	Pullaamsetty Naga Revathi	3149	9.93	Second
Y14EE834	GantaChaturya	3200	9.90	Third

I/IV B.Tech EEE				
Regd No.	**Name**	**Marks(1600)**	**CGPA**	**Rank**
Y15EE816	BathinaRevanth Kumar	1482	9.86	First
Y15EE925	RachaYamini	1464	9.86	Second
Y15EE909	PalakolluNaveena	1494	9.84	Third

M.Tech (PSE)				
Regd No.	**Name**	**Marks(1900)**	**CGPA**	**Rank**
Y14MTPS803	BhavanaDevireddy	--NA---	9.23	First
Y14MTPS810	NadimpalliAnjaniPavani	--NA---	9.13	Second
Y14MTPS805	JanapatiDivya	--NA---	9.13	Second
Y14MTPS812	PeddiSwathiMastan	--NA---	9.00	Third

ROBOTICS WORKSHOP -2017

Mr.N.C.Kotaiah, Associate Professor Coordinator a two day work shop "Autonomous robotics workshop" by Ramson semiconductor Private Limited, Punjab for III B.Tech EEE on 14th and 15th February, 2017. Total 202 students had participated the workshop during these two days.

Accelerated Pavement Testing Efforts Using The Heavy Vehicle Simulator

The need for accelerated testing of pavements arose from the uncertainty of design models and analysis techniques that could previously only be verified with performance observed under normal traffic in real time. Accelerated Pavement testing (APT) was developed to fill the important gap between mechanistic-empirical design models using laboratory materials testing characterization and real, long-term pavement performance monitoring and analysis data.

APT is a technique used to evaluate the performance of full-scale constructed pavements in an accelerated manner as opposed to long-term pavement performance monitoring. To study the negative impacts of the environment and traffic on the condition and performance of pavement structures can take years under true field conditions. APT utilises special full-scale mobile or fixed testing apparatus to simulate these effects in a shorter time period. APT is meant to provide results from full-scale constructed pavements and loading, but with damage accelerated through control of loading and environmental control in order to obtain results in weeks and months rather than the years and decades necessary to complete long-term monitoring.

APT came to the fore in the late 1950s with the AASHO road test in the USA and since then has played an important role in the elevation of road construction to a largely rational process. Metcalf reported 28 active APT programs worldwide, and Hugolists significant findings from these full-scale APT programs. The philosophies behind and the approaches toAPT in the various programmes vary considerably, imparting some degree of uniqueness to several of these experimental set-ups. In the case of the South African Heavy Vehicle Simulator (HVS), this uniqueness results primarily from the fact that it was designed to be used on real, in-service pavements.

Although empirical design procedures developed from the AASHO road test were originally incorporated in the South African design methods in use at that time, a great deal of effort was devoted to the development of design procedures to suit the local

environment, materials and structures. APT appeared to have the capability of rapidly evaluating the performance of these developments and South Africa decided to pursue this approach.

Fixed-facility APT devices, and in some cases loop facilities, have the disadvantage that specially designed experimental pavement sections built at these facilities may not be typical of in-service pavements. In order to address the shortcomings of all the available APT technologies at that time, the former National Institute of Road Research (NIRR) of the Council for Scientific and Industrial Research (CSIR) (now CSIR-Built Environment Unit) developed a fully mobile APT device, the Heavy Vehicle Simulator (HVS). As stated above, the motivation for the development of the HVS was mainly because it could be used for evaluations on as-built mainline pavements throughout South Africa.

The South African pavement design approach during the 1960s was to develop an analytical design procedure in which the engineering characteristics of pavement materials could be used together with a mathematical model to predict or analyze pavement performance . This led to the South African Mechanistic Design method .However, confidence in these models could only be established by verifying their predictions against the performance of real pavements. In 1967 Van Vuurenreported that there was no satisfactory procedure for the determination of the effects of abnormal vehicles on roads and he recommended that full-scale experimental test roads be built and trafficked with abnormal heavy vehicles. This lead to the construction of full-scale test section loops at the Silverton test site of the former NIRR. Heavy vehicles were used to apply the loads on these test sections. The low rate of load applications by using this approach became the motivation for the development of an accelerated loading testing facility.

The first HVS was designed to simulate the damage done to airport runways due to aircraft landing gear impact. This fixed facility was manufactured from Bailey Bridge components and subsequently became known as the HVS Mk I. The reaction force ballast) applied to the pavement utilized water tanks placed above the aircraft wheel

supported by the Bailey Bridge structure. The facility produced useful results but was not mobile. As a result, Van Vuuren in 1972 , recommended that, due to atypical construction of test sections at the Silverton site, a mobile loading facility should be developed that could test real, in-service pavements.

The first fully mobile self-powered HVS Mk II) was commissioned in October 1970 . The 30 ton machine could apply up to 800 repetitions per hour over a 6.2 m long test section. The initial maximum load applied to the pavement was 35 kN (1/2 axle), which was later increased to 75 kN (1 axle). By the end of 1972, 10 accelerated trafficking tests had been conducted with HVS Mk II. Data collected during the initial 10 tests included surface deflections, radius of curvature, permanent deformation, visual distress data, such as cracks, material loss, shear failures, etc.

Analysis of this data provided information on wheel load equivalency factors, rutting in untreated granular layers and load-associated cracking in cement-treated bases. By the end of 1975, 24 tests had been completed with HVS Mk II, nonetheless the main success and focus of the HVS programme began in 1972. A new coal delivery road, had been built between Witbank and Johannesburg between 1966 and 1969. Severe failures occurred on a 48 km section of this road within the first year of operation and major rehabilitation was necessary on certain sections. As a result 18 HVS tests were conducted on this road to investigate these problems .The test results were so promising that in 1972 NIRR motivated the manufacturing of three additional improved HVS Mk III machines, which were designated as HVS 2, 3 and 4 . The machines were financed by NIRR, the National Department of Transport and the Transvaal (now Gauteng) Department of Transport. Pictures of the South African Mk II and II can be seen in Fig. 1.

The desire was expressed by some road authorities to verify new pavement designs in the field before the beginning of any major construction, by constructing trial sections in the same area so that environmental and subgrade conditions would be similar. The objective would be to determine the mechanism of distress and remaining life (in terms of the

number of load repetitions) to "failure" of the proposed pavement. To improve the South African new Pavement and Rehabilitation design procedures. The specific aims were:

- To determine wheel load equivalencies;
- To establish the effect of bi-directional trafficking;
- To verify new designs proposed in the pavement design method;
- To extend the data from above to four climatic regions in South Africa;
- To verify the theoretical predictions of distress in cemented base pavements;
- To evaluate the prediction of fatigue cracking in bituminous pavements, and
- To evaluate stress-dependent response and deformation of existing pavement for overlay design purposes.

Fig. 1. The South African HVS Mk II and III

The HVS-Airfield Mk V at WES is typically used for high wheel load short duration APT studies. For instance, the first test at WES was planned to involve 100,000 coverages of a B727 aircraft gear. Work has been performed on evaluating pavement structures for the new C-17 cargo aircraft including rapid repair strategies. Short term research has focused on wheel load interaction for new aircraft gear configurations. WES is unique in its evaluation of expedient airfield pavements for military use over very short periods, with durations of 4 weeks, 6 months or 2 years. The long-term efforts focus on pavement performance relationships

The South African HVS programme had a significant impact on the development of pavement engineering in South Africa over the past 40 years. The use of this technology has resulted in significant savings in road building and rehabilitation costs to the country. The successful use of the HVS in South Africa led to increasing international interest in the technology, and two HVS MK III's were acquired by Caltrans in 1994 for use in the Cal/APT research program. This extremely successful APT effort has evolved into the current PRC program, now using a MK VI HVS. The California success spurred further interest and the HVS technology was continually improved to the current MK VI version. Seventeen machines are in use worldwide for APT efforts on a wide variety of pavement types and concerns by the organizations listed in the paper. This makes the HVS the most successful and widely used APT device in the world, largely due to its reliability, durability and productivity. Further HVS improvements are under consideration by CSIR and Dynatest, and are likely to be implemented if the current high level of interest in APT continues into the future. Given the international acceptance of HVS technology, the next 40 years are likely to be equally successful.

PIEZOELECTRICITY

What is the Piezoelectric Effect?

Piezoelectric Effect is the ability of certain materials to generate an electric charge in response to applied mechanical stress. The word Piezoelectric is derived from the Greek piezein, which means to squeeze or press, and piezo, which is Greek for "push".

One of the unique characteristics of the piezoelectric effect is that it is reversible, meaning that materials exhibiting the direct piezoelectric effect (the generation of electricity when stress is applied) also exhibit the converse piezoelectric effect (the generation of stress when an electric field is applied).

When piezoelectric material is placed under mechanical stress, a shifting of the positive and negative charge centers in the material takes place, which then results in an external electrical field. When reversed, an outer electrical field either stretches or compresses the piezoelectric material.

The piezoelectric effect is very useful within many applications that involve the production and detection of sound, generation of high voltages, electronic frequency generation, microbalances, and ultra fine focusing of optical assemblies. It is also the basis of a number of scientific instrumental techniques with atomic resolution, such as scanning probe microscopes (STM, AFM, etc). The piezoelectric effect also has its use in more mundane applications as well, such as acting as the ignition source for cigarette lighters.

The History of the Piezoelectric Effect

The direct piezoelectric effect was first seen in 1880, and was initiated by the brothers Pierre and Jacques Curie. By combining their knowledge of pyroelectricity with their understanding of crystal structures and behavior, the Curie brothers demonstrated the first piezoelectric effect by using crystals of tourmaline, quartz, topaz, cane sugar, and Rochelle salt. Their initial demonstration showed that quartz and Rochelle salt exhibited the most piezoelectricity ability at the time.

Over the next few decades, piezoelectricity remained in the laboratory, something to be experimented on as more work was undertaken to explore the great potential of the piezoelectric effect. The breakout of World War I marked the introduction of the first practical application for piezoelectric devices, which was the sonar device. This initial use of piezoelectricity in sonar created intense international developmental interest in piezoelectric devices. Over the next few decades, new piezoelectric materials and new applications for those materials were explored and developed.

During World War II, research groups in the US, Russia and Japan discovered a new class of man-made materials, called ferroelectrics, which exhibited piezoelectric constants many times higher than natural piezoelectric materials. Although quartz

crystals were the first commercially exploited piezoelectric material and still used in sonar detection applications, scientists kept searching for higher performance materials. This intense research resulted in the development of barium titanate and lead zirconatetitanate, two materials that had very specific properties suitable for particular applications.

Piezoelectric Materials

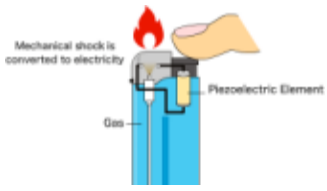
There are many materials, both natural and man-made, that exhibit a range of piezoelectric effects. Some naturally piezoelectric occurring materials include Berlinite (structurally identical to quartz), cane sugar, quartz, Rochelle salt, topaz, tourmaline, and bone (dry bone exhibits some piezoelectric properties due to the apatite crystals, and the piezoelectric effect is generally thought to act as a biological force sensor). An example of man-made piezoelectric materials includes barium titanate and lead zirconatetitanate.

In recent years, due to the growing environmental concern regarding toxicity in lead-containing devices and the RoHS directive followed within the European Union, there has been a push to develop lead free piezoelectric materials. To date, this initiative to develop new lead-free piezoelectric materials has resulted in a variety of new piezoelectric materials which are more environmentally safe.

Applications Best Suited for the Piezoelectric Effect

Due to the intrinsic characteristics of piezoelectric materials, there are numerous applications
that benefit from their use:

1.High Voltage and Power Sources



An example of applications in this area is the electric cigarette lighter, where pressing a button causes a spring-loaded hammer to hit a piezoelectric crystal, thereby producing a sufficiently high voltage that electric current flows across a small spark

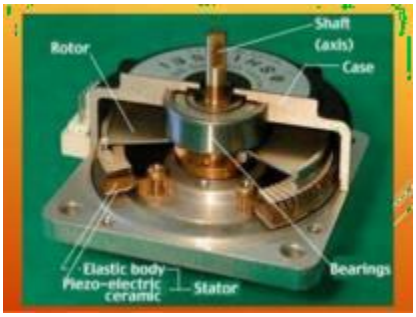
gap, heating and igniting the gas. Most types of gas burners and ranges have a built-in piezo based injection systems.

2.Sensors

The principle of operation of a piezoelectric sensor is that a physical dimension, transformed into a force, acts on two opposing faces of the sensing element. The detection of pressure variations in the form of sound is the most common sensor application, which is seen in piezoelectric microphones and piezoelectric pickups for electrically amplified guitars. Piezoelectric sensors in particular are used with high frequency sound in ultrasonic transducers for medical imaging and industrial nondestructive testing.

3. Piezoelectric Motors

Because very high voltages correspond to only tiny changes in the width of the crystal, this crystal width can be manipulated with better than micrometer precision, making piezo crystals an important tool for positioning objects with extreme accuracy, making them perfect for use in motors, such as the various motor series offered by Nanomotion.



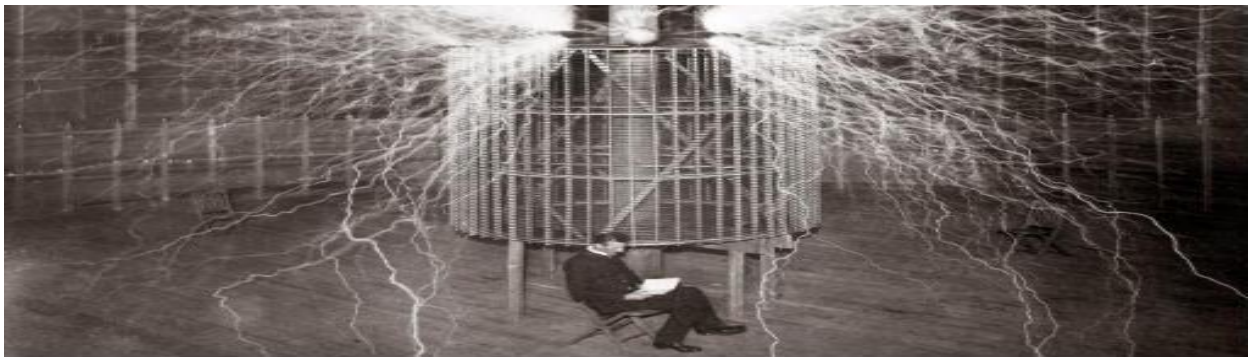
Regarding piezoelectric motors, the piezoelectric element receives an electrical pulse, and then applies directional force to an opposing ceramic plate, causing it to move in the desired direction. Motion is generated when the piezoelectric element moves against a static platform (such as ceramic strips).

The characteristics of piezoelectric materials provided the perfect technology upon which Nanomotion developed our various lines of unique piezoelectric motors. Using patented piezoelectric technology, Nanomotion has designed various series of motors ranging in size from a single element (providing 0.4Kg of force) to an eight element motor (providing 3.2Kg of force). Nanomotion motors are capable of driving both linear and rotary stages, and have a wide dynamic range of speed, from several microns per second

to 250mm/sec and can easily mount to traditional low friction stages or other devices. The operating characteristics of Nanomotion's motors provide inherent braking and the ability to eliminate servo dither when in a static position.

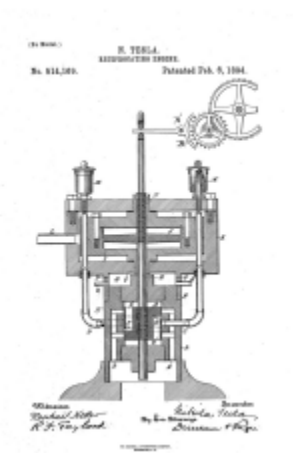
6 Brilliant Tesla Inventions That Never Got Built

"It seems that I have always been ahead of my time," Serbian-American engineer and physicist Nikola Tesla once mused. While the eccentric inventor pioneered advances in radio, television, motors, robotics and electricity including the alternating currenttechnology that's widely used today he also proposed more outlandish ideas. The following six futuristic visions of his have yet to come to fruition, either because of limitations of technology or market viability.



Nikola Tesla sitting in his Colorado Spring laboratory.

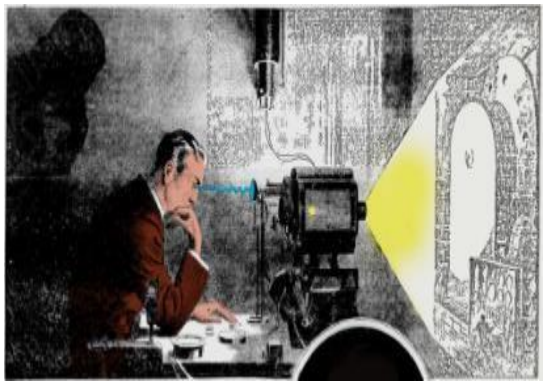
Earthquake Machine



In 1893, Tesla patented a steam-powered mechanical oscillator that would vibrate up and down at high speeds to generate electricity. Years after patenting his invention he told reporters that one day while attempting to tune his mechanical oscillator to

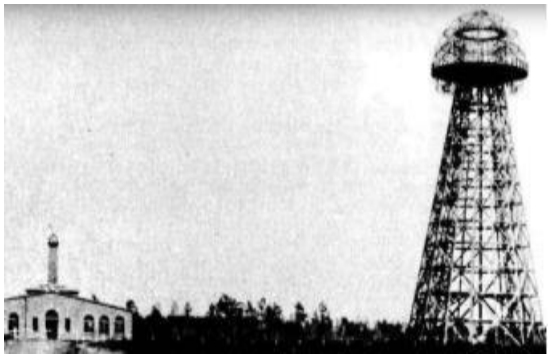
the vibration of the building housing his New York City laboratory, he caused the ground to shake. During the test, Tesla continuously turned up the power and heard cracking sounds. “Suddenly,” he recalled, “all the heavy machinery in the place was flying around. I grabbed a hammer and broke the machine. The building would have been down about our ears in another few minutes.” Police and ambulances arrived on the scene to attend to the commotion, but Tesla told his assistants to remain quiet and tell the police that it must have been an earthquake.

Thought Camera



Tesla believed it could be possible to photograph thoughts. The inspiration came while he was doing experiments in 1893, Tesla told a newspaper reporter decades later: “I became convinced that a definite image formed in thought must, by reflex action, produce a corresponding image on the retina, which might possibly be read by suitable apparatus.” The inventor conceived of reflecting an image on an artificial retina, taking a photograph and projecting the image on a screen. “If this can be done successfully, then the objects imagined by a person would be clearly reflected on the screen as they are formed,” he said, “and in this way every thought of the individual could be read. Our minds would then, indeed, be like open books.”

Wireless Energy



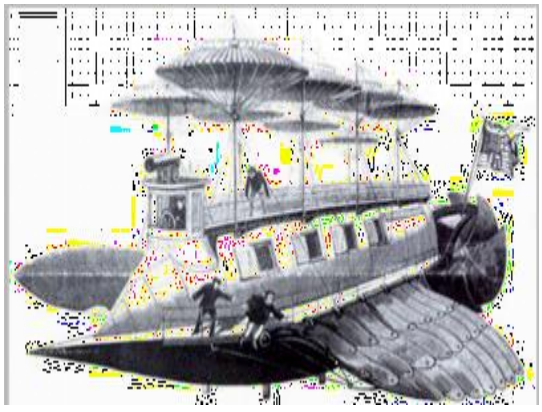
In 1901, Tesla secured $150,000 from financier J.P. Morgan to build a 185-foot-tall, mushroom-shaped tower on the north shore of Long Island capable of transmitting messages, telephony and images to ships at sea and across the Atlantic Ocean by using the Earth to conduct signals. As work began on the structure, called Wardenclyffe Tower, Tesla wanted to

adapt it to allow for wireless power delivery, believing from his experiments on radio and microwaves that he could light up NewYork City by transmitting millions of volts of electricity through the air. Morgan, however, refused to give Tesla any additional funding for his grandiose scheme. (Some speculate that Morgan cut off funds once he realized that Tesla's plan would have crippled his other energy-sector holdings.) Tesla abandoned the project in 1906 before it could ever become operational, and Wardenclyffe Tower was dismantled in 1917.

Artificial Tidal Wave

The engineer and physicist believed the power of science could be harnessed to prevent war. In 1907 the *New York World* reported on another of Tesla's military innovations in which wireless telegraphy would trigger the detonations of high explosives at sea to generate tidal waves so vast that they would capsize entire enemy fleets. The newspaper reported that the artificial tidal wave would "make navies as useless as the paper boats that babies float in bathtubs" and, foreshadowing later claims about the development of nuclear weapons, "by its horrors hasten the day of universal peace."

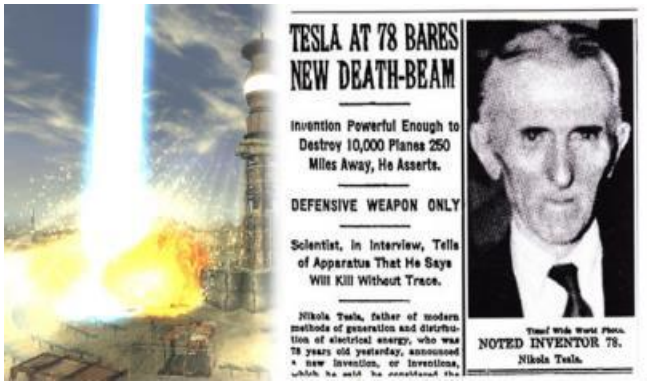
Electric-Powered Supersonic Airship



From the time Tesla was a boy, he had been fascinated with the idea of flight. Combining his knowledge of electrical and mechanical engineering, he began to think more about aviation after the failure of Wardenclyffe. In an article in the July 1919 issue of *Reconstruction* magazine, Tesla discussed his work on

developing a supersonic aircraft that would travel eight miles above the surface of the Earth and generate speeds allowing passengers to travel between New York City and London in three hours. Tesla's concept called for the aircraft to be powered by electricity transmitted wirelessly from power plants on the ground, eliminating the need for aircrafts to carry fuel. "The power supply is virtually unlimited, as any number of power plants can be operated together, supplying energy to airships just as trains running on tracks are now supplied with electrical energy through rails or wires," Tesla said in the article.

Death Beam


TESLA AT 78 BARES NEW DEATH-BEAM

Invention Powerful Enough to Destroy 10,000 Planes 250 Miles Away, He Asserts.

DEFENSIVE WEAPON ONLY

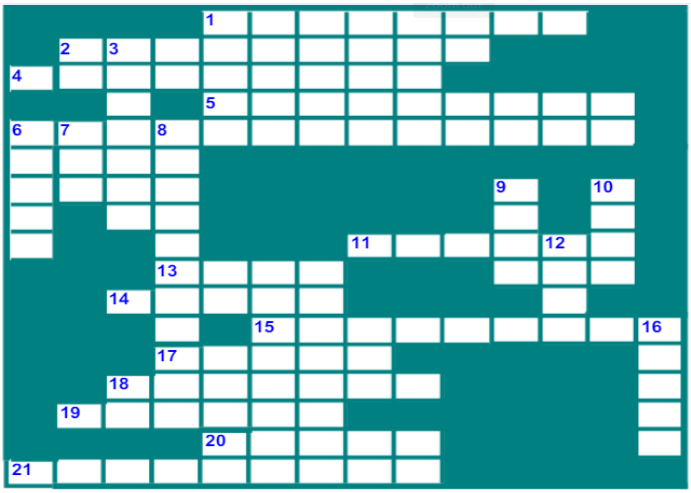
Scientist, in Interview, Tells of Apparatus That He Says Will Kill Without Trace.

Nikola Tesla, father of modern methods of generation and distribution of electrical energy, who was 78 years old yesterday, announced a new invention, or inventions,

Times Wide World Photo.
NOTED INVENTOR 78.
Nikola Tesla.

Tesla's creative mind continued to spark new visions even late in his life. On his 78th birthday, he told *The New York Times* that he had come up with this most important invention, one that would "cause armies of millions to drop dead in their tracks." The invention? A military weapon that would accelerate mercury particles at 48 times the speed of sound inside a vacuum chamber and shoot a high-velocity beam "through the free air, of such tremendous energy that [it] will bring down a fleet of 10,000 enemy airplanes at a distance of 250 miles." Although the press dubbed it a "death beam," Tesla believed it a "peace beam" that would foil attacks by airplanes and invading armies and save lives by acting "like an invisible Chinese wall, only a million times more impenetrable." Tesla offered his particle-beam weapon to numerous governments, including the United States, but the only country to show interest was the Soviet Union, which conducted a partial test in 1939.

CROSSWORD:



ACROSS

1 Another name of gas relay or sudden pressure relay(8)

2 A measure of total opposition to current (9)

4 An electrical concept associated with putting metals close to energized lines(9)

5 What loads are said to be if they can be disconnected during short periods of system distrubances(9)

6 A mechanical switching device to connect busbars of two sections(13)

11 The period during which a generating unit is out of service(6)

13 Used where the motor switching device is a contactor to provide short circuit protection(4)

14 The rate at which energy is transferred (5)

15 The range of frequencies that a signal contains or circuit can handle(8)

17 Has a function opposite to generator(5)

18 Convert AC to DC power(7)

19 A volumetric unit of measure of crude and petroleum products(6)

20 The Electrical genius best known for inventing Alternating current(5)

21 Sinosoidal Voltages or currents having frequencies that are whole multiples of the power freqquencyawhich the supply system is designed to operate (9)

DOWN

3He is associated with the discovery of radio (7)

6Physiologically dangerous current (5)

7A device designated to restart motors (3)

8A type of equipment that is associated distribution of energy(11)

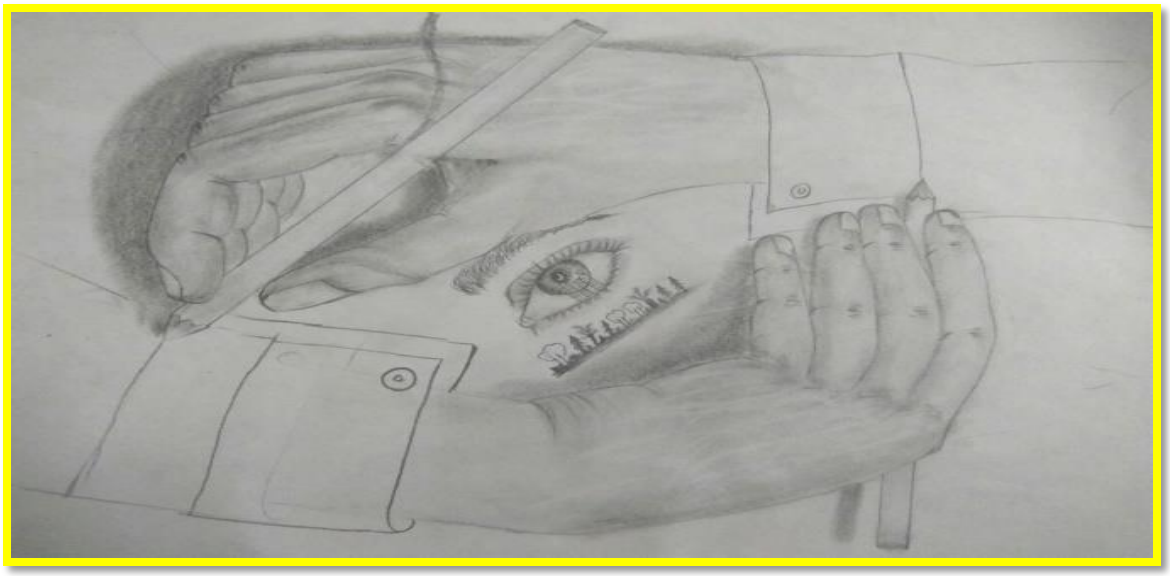
9Designation for a type of transformer cooling (4)

10Any substance that can be burnt to produce heat (4)

12The layout of an electrical distribution network (4)

16Measure of inductance (5)

SKETCH GOT FIRST PRIZE IN COLLEGE COMPETITION



(G.HEMANTH KUMAR IV/IV B.Tech,Y15EE848)

SOME OF THE 3D ARTS BY HEMANTH KUMAR.G

CROSSWORD SOLUTION

				B	U	C	H	H	O	L	Z		
	I	M	P	E	D	A	N	C	E				
F	L	A	S	H	O	V	E	R					
		R		S	H	E	D	D	A	B	L	E	
S	E	C	T	I	O	N	A	L	I	S	E	R	
H		O	R		N							M	O
O		N	A		A								U
C		I	N		N								T
K			S					G					A
			F	U	S	E		R					G
		P	O	W	E	R		I					E
			R		B	A	N	D	W	I	T	H	
			M	O	T	O	R			F	U	E	L
		R	E	C	T	I	F	Y				N	
	B	A	R	R	E	L						R	
				T	E	S	L	A				Y	
H	A	R	M	O	N	I	C	S					

R.V.R. &J.C. COLLEGE OF ENGINEERING

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STANDING 1st row : Sravani,Yamini,Swethasri,Yamini,YaminiSivaparvathi,Anusha,Durgasusmitha,prasanthi,nirmalajyothi,DivyaSree,Roja,pallavi, RamyaSree,Saimounika,Indraja, Niharika,Uma,Madhuri,Mounika,Anusha.

STANDING 2nd row : Aasrith,Akhil,Jahnavi,RamyaSree,Amulya,Sucharitha,Haritha,Ramya,Saisushma,Quazar,Mr.A.RamaKoteswaraRao,Mr.B.Sarath Chandra,Mr.Sk.Meeravali, Mr.Sunil,HanakHarsha,Mr.MasthanRao,Mr.SrinivasaRao,Mr.Obaiah,Mr.SivaKumar,Mr.Maruthi

STANDING 3rd row : Trinath,Vinay,Syamsundar,Aasrith,Bhanu,Ajay,Bhargav,SaiJayaram,Mahesh,Harish,Saikrishna,Gopal,Vasu,Saibabu,Udaykiran, Gangadhar,Phani,HanumaNaik,Nitin.

STANDING 4rd row : Avinash,Murali,Aditya,Manikanta,SrinivasaRao,Koti,Abhishek,Manikanta,yogiReddy,MuraliBharadwaj,YathiRajaVarma,Balu, JayaChandra,Sardhar,udaySudheer,Vinodkumar,VeraPrathap,Anurag.

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EEE -23

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STANDING 1st row : Navya, Vaishnavi,Sameera,Sri laxmi,Supriya,Harika,Bhanu,Jhansi,Mounika,Krishna Priyanka,Likhitha,Sravya,Hima Bindu,Mounika, KrishnaYasaswi,Laxmi Priyanka,Santhi,Lalithya,Sree Teja.

STANDING 2nd row : Mr.ORK,Mr.Anil,Nagasrinivas,HariKrishna,Haritha,Sreelekha,Sarvani,Gayathri,Charunya,Mr.ARK,Mr.BSC,Mr.skm,Mr.Sunil,Mr.chrr, Mr.Mastan Rao,Mr.Bhanu Prakash, Mr.Srinivasa Rao, Mr.Obaiaha, Mr.Siva Kumar, Mr.Sandeep, Mr.Priyatham, Mr.Nagarjuna, Mr.Maruthi.

STANDING 3rd row : Rangadeep,Rushendra,SaiChandu,Venkatesh,SaiRam,AnjiNaik,Harshith,SaiKrishna,CareyChinoy,Naresh, Jagadeesh, Subrahmanyam,Vynatheya,Kranthi,Dinesh,BajiBabu,BalaKrishnaReddy,DheerajKrishna, Bhargav, Purna Sai,Srikanth.

STANDING 4rd row : SaiLikhith,ManikyaRao,MukheshManaswin,Sravan,Srikanth,RamaKrishna,MainKhan,Premchand,Gopi, Sagar,VijaySrinivas, NagarjunaPradeep,GaneshBabu,Abishek,JayapalReddy,PraveenKumar,Premchand, Praneeth,Chakradhar Reddy,Mohan.

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STANDING 1st row : Anusha,Srilaxmi,Harika,Umra,HusneJahan,BhavyaSree,MainaRameejun,Pavani,Sravani,Dharani,Baji Begum,Mounika,Eswari, Preethi,Pujitha,Blessy Susmitha,Jahnavi.

STANDING 2nd row : Tulasi,tejaswini,Haritha,Rajeswari,Roopa,SaiJyothi,Nandini,Lokeswari,Pushpak,Mr.ORK,Mr.ARK,Mr.BSC,Mr.SKM,Mr.Sunil,Mr.Anil, Mr.MastanRao,Mr.SrinivasaRao,Mr.SivaKumar,Mr.SudhakarReddy, Mr.priyatham.

STANDING 3rd row : RahulBasha,JithendraPhani,Prasanth,Aravind,VenkataReddy,Abhinandh,SivaSai,Harish,Prabhu,Sasank, Sudheer,Maharshi, Khajavali,Kiran,Ananyadeep, Mr.Obaiaha, Mr.Bhanu Prakash, Mr.Sandeep.

STANDING 4rd row : Lokesh,Paidi Raju,Vinay,Yaseen,Seshank,Chenito,Venkatesh,Hiteesh,Faeooq,Sai Teja,Jani Basha,Gopi,Naggor Basha,Rajesh, Ansar,Yaswanth,Kartheek.

STANDING 5rd row : Mr.Maruthi,Surendra,NarendraManikanta,AsifAli,Dheeraj,Gopi,KishoreBabu,RajSrikar,Muthyam, Sambasiva Akhil,Naresh

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